Space Weather Forecast

Issued on Thursday, 31 March 2022 at 01:18 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Chance of further Moderate-class flares throughout. Slight chance of further S1 or above solar radiation storms. G1-G2/Minor-Moderate geomagnetic storms are expected on Days 2 and 3 (31 March and 1st April), with a Chance of a G3/Strong storm.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been at High levels over the past 24 hours, with a Strong X-ray flare, which originated from a sunspot region 2975 in the northwest quadrant and resulted in a minor radio blackout. The strong flare has produced a coronal mass ejection (CME) seen in available coronagraph imagery, which is currently being analysed for any Earth-directed component.

There are currently four numbered sunspots on the visible disc, with 2976 in the northwest quadrant, currently the largest sunspot, but remains stable. Meanwhile, 2975 (also in the NW quadrant) remains magnetically complex and continues to develop, with the presence of delta spots, and produced the recent strong X-ray flare. 2978 continues to rotate across the SE quadrant, but remains stable. Other remaining sunspots on the disc are relatively small and magnetically simple.

Solar Wind / Geomagnetic Activity: Solar wind speeds have been mostly at slightly elevated levels. The strength of the Interplanetary Magnetic Field has been at weak levels, with the north-south component showing weak fluctuations. Geomagnetic activity was mostly Quiet (Kp 1-2), with BGS showing one Unsettled (Kp 3) interval.

Energetic Particles / Solar Radiation: The high energy proton flux (10 MeV) measured at GOES-16 continued a slow decline following the S1/Minor solar radiation storm on 28th March. Protons have recently become slightly elevated again at 10 MeV, with a further minor solar radiation storm possible into Day 1 (31 March).

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is expected to be mostly Low, but with the chance of further Moderate-class flares, and a slight chance of a strong X-ray flare, mainly from region 2975 in the northwest quadrant.

Solar Wind / Geomagnetic Activity: The next enhancement is expected to come from the 28th March CME(s), which are anticipated to arrive, as a combined CME at Earth on Day 1 (31 March). CME effects are then expected to continue into Day 2 (1st April), before gradually weakening into Day 3 (2nd April).

Quiet to Unsettled conditions initially, before Active to G1-G2/Minor-Moderate storm periods are expected on Day 1 (31 March), with the Chance (30%) of a G3/Strong Storm, and perhaps a

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Slight Chance (10%) of a G4/Severe Storm. Disturbed geomagnetic conditions are expected to continue into Day 2 (1st April), before gradually easing into Day 3 (2nd April). However, geomagnetic activity may remain Unsettled to Active Days 3 and 4 (2nd and 3rd April) due to a possible fast wind from a coronal hole(s) influence.

Energetic Particles / Solar Radiation: The continued activity of 2975 in particular gives the slight chance of further potential enhancements above the S1 threshold during the period.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	80	60	30	10
Strong	G3	No	30	30	5	1
Severe	G4	No	10	10	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	50	50	50	50
Very Active	R3 to R5 X	Yes	10	10	10	10

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	Yes	20	10	10	10
Very Active	≥ S3 *	No	1	1	1	1

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Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	**≥ S1**	Yes	20	10	10	10
Very Active	**≥ S3 ***	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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